



COURSE OVERVIEW EE1195 **FACTS Devices & Power Flow Control**

Course Title

FACTS Devices & Power Flow Control

Course Date/Venue

November 23-27, 2026/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference

EE1195

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.



This course is designed to provide participants with a detailed and up-to-date overview of FACTS Devices and Power Flow Control. It covers the power flow in transmission systems, reactive power and voltage control and limitations of conventional transmission; the FACTS devices, types of FACTS controllers and power electronics in FACTS; the static VAR compensator (SVC), static synchronous compensator (STATCOM), thyristor controlled series capacitor (TCSC) and static synchronous series compensator (SSSC); comparing shunt versus series devices and the modeling of FACTS devices; the unified power flow controller (UPFC) and interline power flow controller (IPFC); and the power flow control using FACTS and FACTS in stability enhancement.



During this interactive course, participants will learn the renewable integration and economic benefits of FACTS; the control strategies for FACTS devices, coordination of multiple FACTS devices and FACTS in optimal power flow (OPF); the dynamic simulation of FACTS, integration with protection systems and installation and practical considerations; the FACTS in smart grids, comparison with HVDC systems and emerging technologies; and the high capital cost, control complexity, operational challenges and cybersecurity considerations.

Course Objectives/Outcomes & Benefits for the Participants

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on FACTS devices and power flow control
- Discuss power flow in transmission systems, reactive power and voltage control and limitations of conventional transmission
- Identify FACTS devices, types of FACTS controllers and power electronics in FACTS
- Recognize static VAR compensator (SVC), static synchronous compensator (STATCOM), thyristor controlled series capacitor (TCSC) and static synchronous series compensator (SSSC)
- Compare shunt versus series devices and describe the modeling of FACTS devices
- Determine unified power flow controller (UPFC), interline power flow controller (IPFC), power flow control using FACTS and FACTS in stability enhancement
- Apply renewable integration and identify economic benefits of FACTS
- Carryout control strategies for FACTS devices, coordination of multiple FACTS devices and FACTS in optimal power flow (OPF)
- Apply dynamic simulation of FACTS, integration with protection systems and installation and practical considerations
- Identify FACTS in smart grids, comparison with HVDC systems and emerging technologies
- Discuss high capital cost, control complexity, operational challenges and cybersecurity considerations

Exclusive Smart Training Kit - H-STK®



*Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of FACTS devices and power flow control for power system planners and operators, transmission and distribution engineers, utility engineers and grid operators, protection and control engineers, electrical power engineers, renewable energy integration specialists, SCADA and automation engineers, consultants involved in transmission planning and optimization, professionals working in smart grids and energy systems, researchers and academicians in power systems, EPC and power infrastructure engineers and other technical staff.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours

Certificate Accreditations

Haward's certificates are accredited by the following international accreditation organizations:

- 
British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- 
The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.



Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Ahmed Abozeid is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of **Onshore & Offshore** experience within the **Oil & Gas** and **Power** industries. His wide expertise covers **HV Cable Design, Cable Splicing & Termination, Cable Jointing Techniques, High Voltage Electrical Safety, HV/MV Cable Splicing, High Voltage Circuit Breaker Inspection & Repair, High Voltage Power System Safe Operation, High Voltage Safety, High Voltage Transformers, Safe Operation of High Voltage & Low Voltage Power Systems, Electric Distribution System Equipment, ABB 11KV Distribution Switchgear, Rotork Operation & Maintenance, Power System Protection and Relaying, Electrical Motors & Variable Speed Drives, Motor Speed Control, Power Electronic Converters, Control Valve, Flowmetering & Custody Transfer, Meters Calibration, Installation & Inspection, Crude Metering & Measurement Systems, Flow Meter Maintenance Troubleshooting, AC Converters Section, Electromagnetic Compatibility (EMC), Motor Failure Analysis & Testing, Machinery Fault Diagnosis, Bearing Failure Analysis Process Control & Instrumentation, Process Control Measurements, Control System Commissioning & Start-Up, Control System & Monitoring, Power Station Control System, Instrumentation Devices, Process Control & Automation, PID Controller, Distributed Control Systems (DCS), Programmable Logic Controllers (PLC), ABB PLC & DCS System, Gas Analyzers, Simulation Testing, Load Flow, Short Circuit, Smart Grid, Vibration Sensors, Cable Installation & Commissioning, Calibration Commissioning and Site Filter Controller. Further, he is also well-versed in **Fundamentals of Electricity, Electrical Standards, Electrical Power, PLC, Electrical Wiring, Machines, Transformers, Motors, Power Stations, Electro-Mechanical Systems, Automation & Control Systems, Voltage Distribution, Power Distribution, Filters, Automation System, Electrical Variable Speed Drives, Power Systems, Power Generation, Power Transformers, Diesel Generators, Power Stations, Uninterruptible Power Systems (UPS), Battery Chargers and AC & DC Transmission.** He is currently the **Project Manager** wherein he manages, plans and implements projects across different lines of business.**

Mr. Ahmed worked as the **Electrical Manager, Electrical Power & Machine Expert, Electrical Process Leader, Team Leader, Electrical Team Leader, Technical Instructor, and Instructor/Trainer** from various companies such as the **Lafarge Nigeria, Egyptian Cement Company, ECC Training Center, Alrajhi Construction & Building Company and Ameria Cement Company, just to name a few.**

Mr. Ahmed has a **Bachelor's degree in Electrical Engineering.** Further, he is a **Certified Instructor/Trainer, Certified TQUK Level 3 Vocational Achievement (RQF) Assessor** and has delivered numerous trainings, seminars, courses, workshops and conferences internationally.



Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: Monday, 23rd of November 2026

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Power Flow in Transmission Systems Real and Reactive Power Flow Concepts • Power-Angle Relationship • Role of Transmission Impedance • Limitations of Conventional Power Systems
0930 – 0945	Break
0945 – 1030	Reactive Power & Voltage Control Importance of Reactive Power • Voltage Profile Management • Sources of Reactive Power • Impact on System Stability
1030 – 1130	Limitations of Conventional Transmission Thermal Limits • Voltage Stability Limits • Stability Constraints • Need for Controllability
1130 – 1215	Basics of FACTS Devices Definition and Objectives • Evolution of FACTS Technology • Benefits (Flexibility, Stability, Capacity) • Classification Overview
1215 – 1230	Break
1230 – 1330	Types of FACTS Controllers Series Controllers • Shunt Controllers • Combined Controllers • Hybrid Configurations
1330 – 1420	Power Electronics in FACTS Role of Thyristors and IGBTs • Switching Techniques • Voltage Source Converters (VSC) • Control Principles
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One



Day 2: Tuesday, 24th of November 2026

0730 – 0830	Static VAR Compensator (SVC) <i>Operating Principle • Components (TCR, TSC) • Voltage Regulation • Applications and Limitations</i>
0830 – 0930	Static Synchronous Compensator (STATCOM) <i>VSC-Based Operation • Reactive Power Control • Advantages Over SVC • Dynamic Performance</i>
0930 – 0945	Break
0945 – 1100	Thyristor Controlled Series Capacitor (TCSC) <i>Series Compensation Basics • Control of Line Reactance • Power Flow Control • Stability Improvement</i>
1100 – 1215	Static Synchronous Series Compensator (SSSC) <i>VSC-Based Series Compensation • Voltage Injection Principle • Control Strategies • Applications</i>
1215 – 1230	Break
1230 – 1330	Comparison of Shunt versus Series Devices <i>Functional Differences • Performance Characteristics • Cost Considerations • Application Scenarios</i>
1330 – 1420	Modeling of FACTS Devices <i>Steady-State Models • Dynamic Models • Representation in Load Flow Studies • Simplifications and Assumptions</i>
1420 – 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	Lunch & End of Day Two

Day 3: Wednesday, 25th of November 2026

0730 – 0830	Unified Power Flow Controller (UPFC) <i>Structure and Components • Simultaneous Control of Voltage, Impedance, Angle • Operating Modes • Practical Applications</i>
0830 – 0930	Interline Power Flow Controller (IPFC) <i>Concept and Operation • Multi-Line Power Flow Control • Benefits and Limitations • Coordination Between Lines</i>
0930 – 0945	Break
0945 – 1100	Power Flow Control Using FACTS <i>Controlling Real and Reactive Power • Load Balancing • Congestion Management • Enhancing Transfer Capability</i>
1100 – 1215	FACTS in Stability Enhancement <i>Improving Transient Stability • Damping Oscillations • Voltage Stability Improvement • Dynamic Response Support</i>
1215 – 1230	Break
1230 – 1330	FACTS for Renewable Integration <i>Managing Variability of Renewables • Voltage Support for Wind/Solar • Grid Flexibility • Hybrid Systems</i>
1330 – 1420	Economic Benefits of FACTS <i>Increased Transmission Capacity • Deferred Infrastructure Investment • Loss Reduction • Cost-Benefit Analysis</i>
1420 – 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	Lunch & End of Day Three



Day 4: Thursday, 26th of November 2026

0730 – 0830	Control Strategies for FACTS Devices <i>Open-Loop versus Closed-Loop Control • PI/PID Controllers • Advanced Control Techniques • Stability Considerations</i>
0830 – 0930	Coordination of Multiple FACTS Devices <i>Interaction Between Devices • Control Coordination Strategies • Avoiding Adverse Interactions • Multi-Device Optimization</i>
0930 – 0945	Break
0945 – 1100	FACTS in Optimal Power Flow (OPF) <i>Incorporating FACTS into OPF • Objective Functions and Constraints • Optimization of Device Settings • Impact on System Performance</i>
1100 – 1215	Dynamic Simulation of FACTS <i>Time-Domain Simulation • Disturbance Response Analysis • Performance Evaluation • Software Tools (MATLAB, Powerfactory)</i>
1215 – 1230	Break
1230 – 1330	Integration with Protection Systems <i>Impact on Relay Operation • Coordination Challenges • Protection Scheme Adaptation • Reliability Considerations</i>
1330 – 1420	Installation & Practical Considerations <i>Site Selection • Installation Challenges • Commissioning Procedures • Maintenance Requirements</i>
1420 – 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	Lunch & End of Day Four

Day 5: Friday, 27th of November 2026

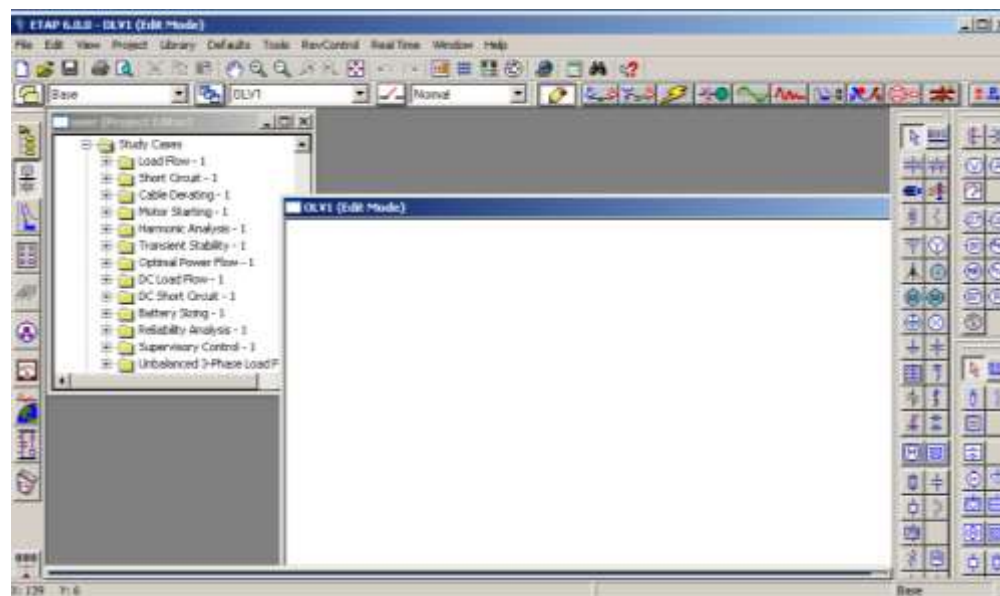
0730 – 0830	Case Studies of FACTS Applications <i>SVC/STATCOM Installations • UPFC Deployment Examples • Congestion Management Cases • Lessons Learned</i>
0830 – 0930	FACTS in Smart Grids <i>Role in Modern Grid Architecture • Integration with Digital Systems • Real-Time Monitoring and Control • Smart Grid Applications</i>
0930 – 0945	Break
0945 – 1100	Comparison with HVDC Systems <i>AC versus DC Transmission • FACTS versus HVDC Capabilities • Hybrid Systems • Application Scenarios</i>
1100 – 1215	Emerging Technologies <i>Modular Multilevel Converters (MMC) • Advanced Semiconductor Devices • AI-Based Control • Hybrid FACTS Solutions</i>
1215 – 1230	Break
1230 – 1300	Challenges in FACTS Implementation <i>High Capital Cost • Control Complexity • Operational Challenges • Cybersecurity Considerations</i>



1300 - 1345	Capstone Project & Evaluation <i>Designing a FACTS-Based Solution • Selecting Appropriate Device • Analyzing Impact on Power Flow • Presenting Results and Recommendations</i>
1345- 1400	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 - 1415	POST-TEST
1415 - 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator “ETAP Software”.



ETAP Software

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org